

# CLAIMS

1. A method of exchanging routing information between Virtual Private Network (VPN) sites, the method comprising the steps of:

receiving first routing information from a first VPN site implemented according to a first VPN model by a gateway network device;

receiving second routing information from a second VPN site implemented according to a second VPN model by the gateway network device; and

storing said first routing information and said second routing information in a routing table.

2. The method of claim 1, wherein at least one of the routing table and entries in the routing table is transmitted to a network device to facilitate transmission of data between the first VPN site and the second VPN site.

3. The method of claim 1, further comprising utilizing the routing table by the gateway network device to facilitate transmission of data between the first VPN site and the second VPN site.

4. The method of claim 1, further comprising transmitting, by the gateway device, the first routing information to the second VPN.

5. The method of claim 1, further comprising transmitting, by the gateway device, the second routing information to the first VPN.

6. The method of claim 1, wherein the first VPN site implements a virtual router based VPN (VR-based VPN), and wherein the second VPN site implements a virtual routing and forwarding tables based VPN (VRF-based VPN).

7. The method of claim 1, further comprising instantiating, by the gateway, at least a first virtual router protocol connection configured to enable reception of at least a portion of the first

routing information, and instantiating, by the gateway, at least a second virtual router protocol connection configured to enable reception of at least a portion of the second routing information.

8. The method of claim 1, wherein the first virtual router protocol connection is based on  
5 at least one of Open Shortest Path First (OSPF), Integrated Intermediate System to Intermediate System (Integrated IS-IS), Routing Information Protocol (RIP), and Border Gateway Protocol (BGP), which is used to exchange routing information over the VPN tunnel.

9. The method of claim 1, wherein the second virtual router protocol connection is based  
10 on MultiProtocol Border Gateway Protocol (MP-BGP).

10. The method of claim 1, wherein the routing table comprises entries comprising a  
VPN identifier associated with the first routing information, and a VPN identifier associated with  
the second routing information.

15 11. The method of claim 10, wherein the entries further comprise the first routing information and the second routing information.

12. The method of claim 11, wherein the first routing information is a route from the  
20 gateway network device to the first VPN site, and wherein the second routing information is a Border Gateway Protocol (BGP) next hop attribute and MultiProtocol Label Switching (MPLS) VPN label.

13. The method of claim 12, further comprising the steps of:  
25 establishing a first secure tunnel between the first VPN site and the gateway network device, and wherein the step of receiving first routing information utilizes the first secure tunnel;  
and

establishing a second secure tunnel between the second VPN site and the gateway  
network device, and wherein the step of receiving second routing information utilizes the second  
30 secure tunnel.

14. A method of interconnecting a Virtual Private Network (VPN) tunnel between a VPN site implementing a Virtual Router based VPN (VR-based VPN), and a VPN site implementing a VPN Routing and Forwarding table based VPN (VRF-based VPN), the method comprising the steps of:

5       collecting routing information from the VR-based VPN;  
collecting routing information from the VRF-based VPN; and  
correlating the routing information from the VR-based VPN and the routing information from the VRF-based VPN; and  
storing the correlated routing information in a VPN routing information base.

10       15. The method of claim 14, further comprising the step of:  
disseminating the correlated routing information to the VR-based VPN and the VRF-based VPN.

15       16. The method of claim 14, further comprising the steps of:  
receiving a data packet having a header from the VR-based VPN;  
ascertaining routing information from the header;  
obtaining correlated routing information from the VPN routing information base; and  
modifying the header using the correlated routing information.

20       17. The method of claim 16, further comprising the step of:  
transmitting the data packet with the modified header to the VRF-based VPN.

25       18. The method of claim 14, further comprising the steps of:  
receiving a packet having a header from the VRF-based VPN;  
ascertaining routing information from the header;  
obtaining correlated routing information from the VPN routing information base; and  
modifying the header using the correlated routing information.

30       19. The method of claim 18, further comprising:  
transmitting the data packet with the modified header to the VR-based VPN.

20. The method of claim 14, further comprising the step of:  
translating quality of service information between the VR-based VPN and the VRF-based  
VPN.

21. The method of claim 14, further comprising the step of:  
transmitting the correlated routing information to a network device configured to handle  
data traffic on the VPN tunnel between the VPN site implementing the VR-based VPN and the  
VPN site implementing the VRF-based VPN.

22. A method of providing redundant gateway network devices, comprising:  
instantiating a first gateway network device on a communications network;  
instantiating a second gateway network device on a communications network;  
transmitting first routing information from a first VPN site implementing a first VPN  
model to the first gateway network device, said first routing information having a first cost;  
transmitting second routing information from the first VPN site to the second gateway  
network device, said second routing information having a second cost;  
transmitting the first routing information from the first gateway network device to a  
second VPN site implementing a second VPN model;  
transmitting the second routing information from the second gateway network device to  
the second VPN site; and  
selecting, by the second VPN site, one of the first and second gateway network devices  
based on at least the first and second costs.

23. The method of claim 22, wherein the first VPN model is a Virtual Router (VR)  
model; and wherein the second VPN model is based on VPN Routing and Forwarding (VRF)  
tables.

24. A network device, comprising  
a first protocol connection for interfacing with a first Virtual Private Network (VPN)  
tunnel instantiated according to a first VPN model;

a second protocol connection for interfacing with a second VPN tunnel instantiated according to a second VPN model;

a routing table configured to associate routing information from the first VPN tunnel with routing information from the second VPN tunnel.

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25. The network device of claim 24, wherein the routing table contains entries comprising a first tunnel VPN ID, a first tunnel route information, a second tunnel VPN ID, and a second tunnel route information.

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26. The network device of claim 24, wherein the first VPN tunnel is instantiated through a virtual router, and wherein the second VPN tunnel is instantiated through a VPN Routing and Forwarding (VRF) table.

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27. The network device of claim 26, wherein the routing table contains a virtual router VPN identifier, a virtual router route information, a VRF VPN identifier, and a Border Gateway Protocol (BGP) next hop and MultiProtocol Label Switching (MPLS) VPN label.

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